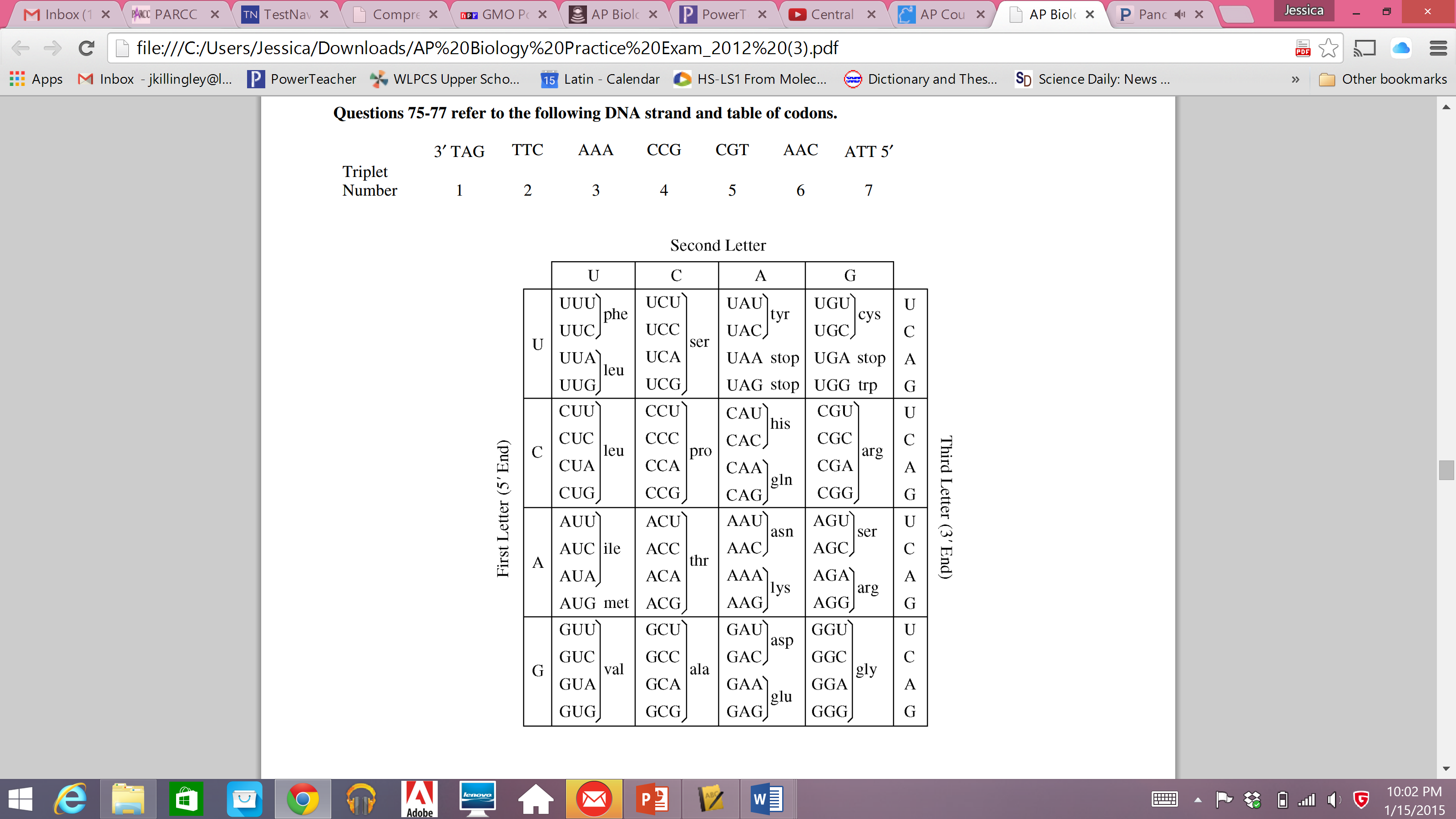
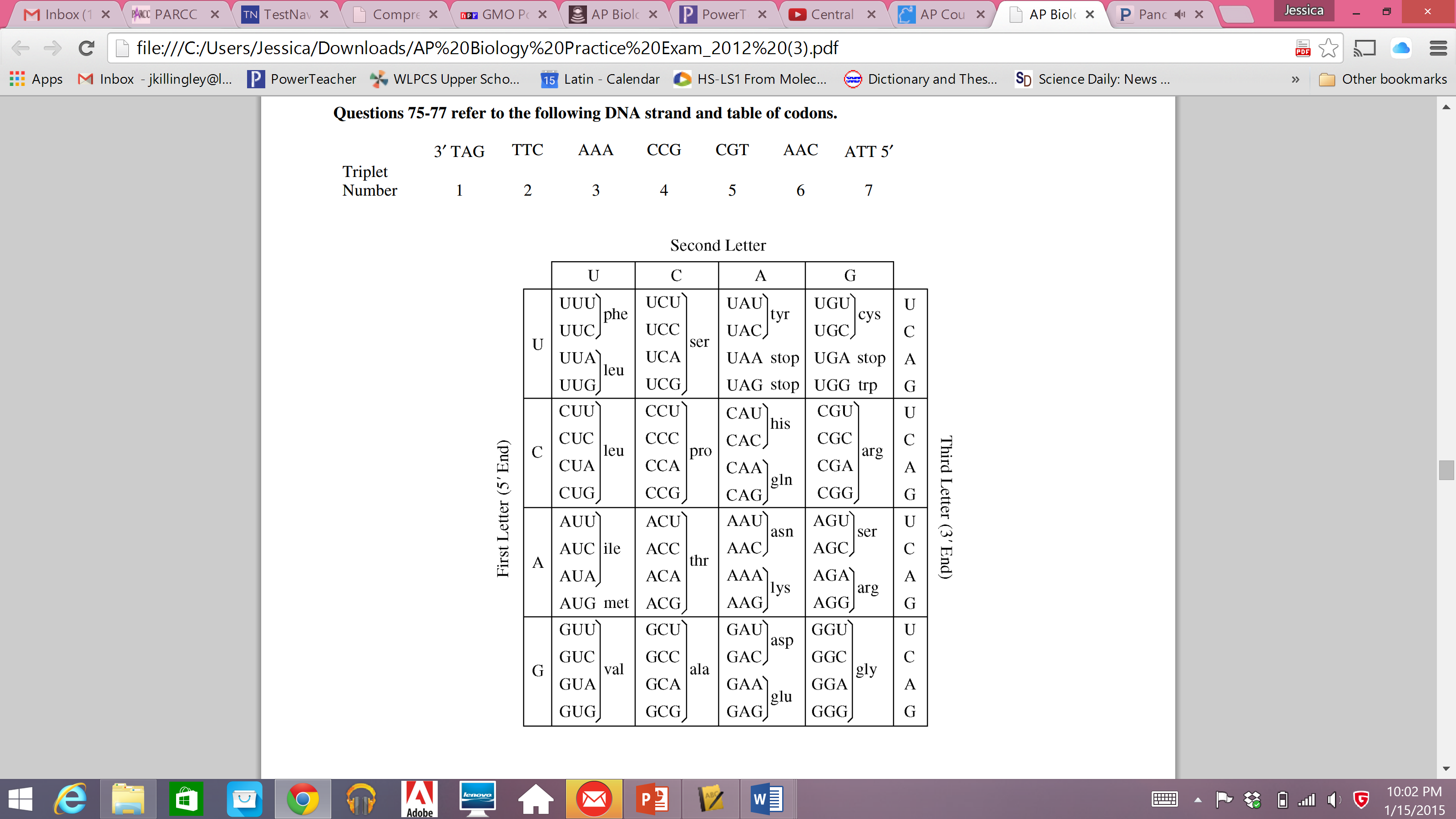
Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period:\_\_\_\_\_

Questions 1 to 3 refer to the following DNA strand and table of codons.

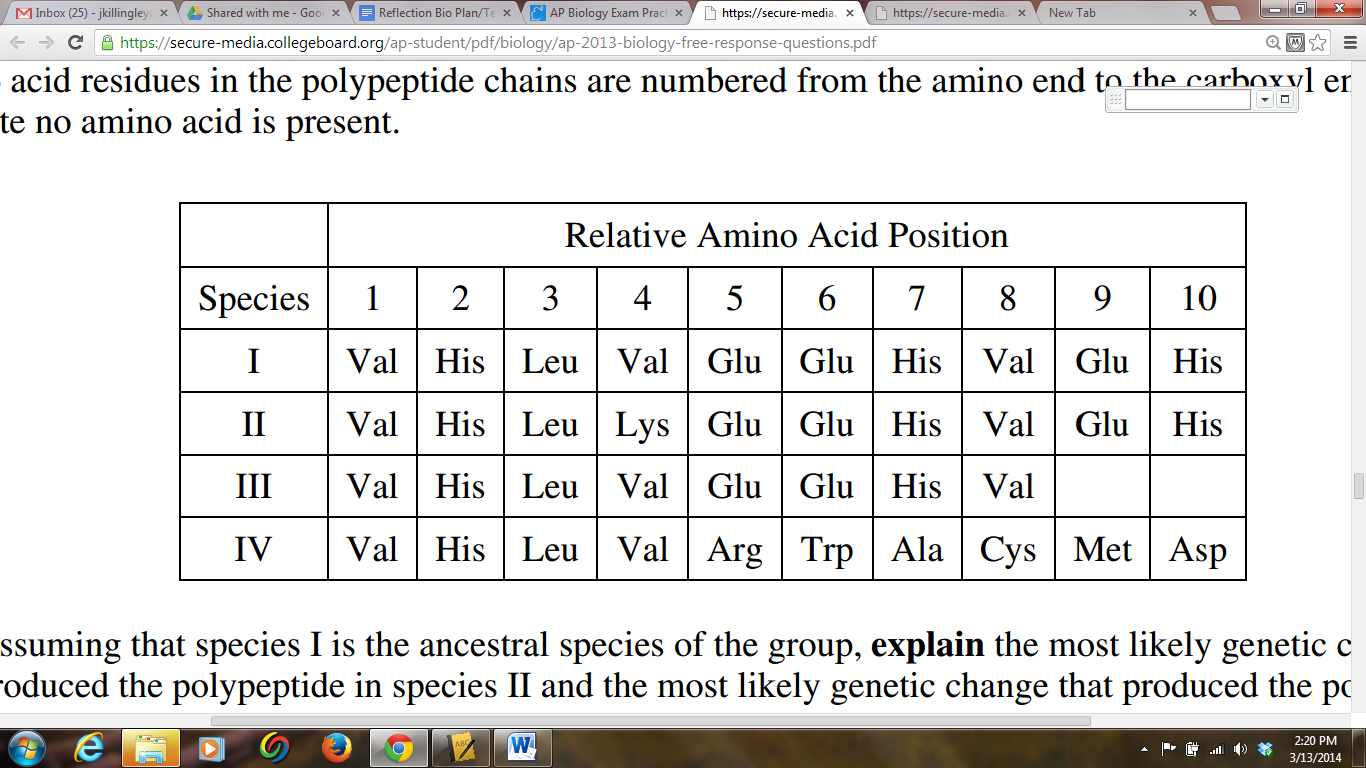




1. The mRNA transcribed from the DNA would read
2. 5’ TAG TTC AAA CCG CGT AA AAT 3’
3. 5’ ATC AAG TTT GGC GCA TTG TAA 3’
4. 5’ AUC AAG UUU GGG GCA UUU UAA 3’
5. 5’ AAU CAA UCG GCC AA CUU GAU 3’
6. Which of the following modifications of the DNA would produce the greatest change in the primary structure of the polypeptide chain?
7. Deleting the first T in the second triplet
8. Changing the second triplet to read 3’ CTC 5’
9. Changing the third triplet to read 3’ AAC 5’
10. Changing the fourth triplet to read 3’ CCA 5’
11. In which of the following would there NOT be a change in the amino acid sequence of the peptide coded for by this DNA?
12. Changing 3’ AAA 5’ to read 3’ AAG 5’
13. Changing 3’ TTC 5’ to read 3’ ATC 5’
14. Changing 3’ CCG 5’ to read 3’ GGC 5’
15. Deleting the first A from 3’ AAA 5’

**Proteins and Mutation “Short” Free Response Question (2013, 4 points)**

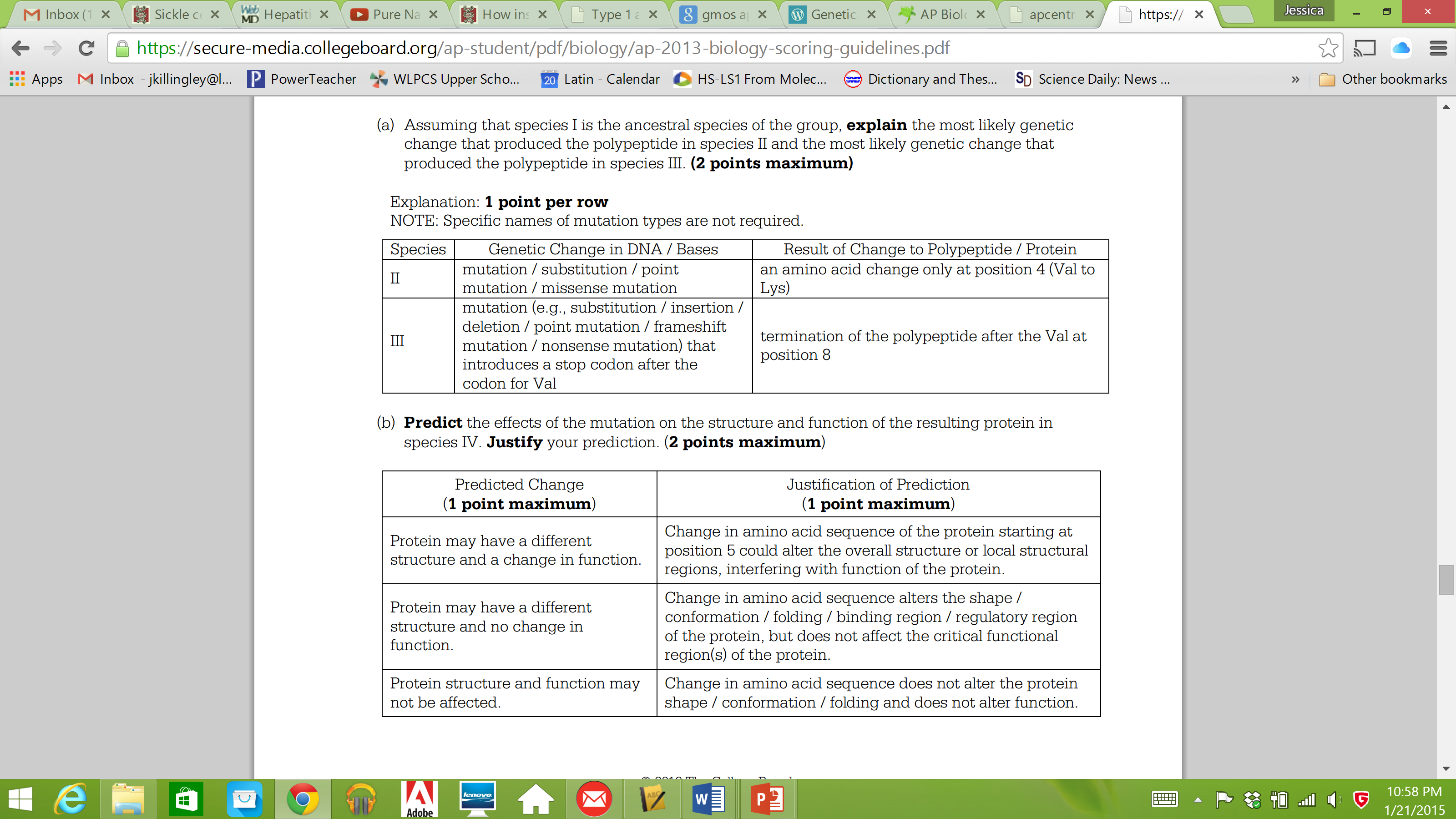
The table below shows the amino acid sequence of the carboxyl-terminal segment of a conserved polypeptide from four different, but related, species. Each amino acid is represented by a three-letter abbreviation, and the amino acid residues in the polypeptide chains are numbered from the amino end to the carboxyl end. Empty cells indicate no amino acid is present.



(a) Assuming that species I is the ancestral species of the group, **explain** the most likely genetic change that produced the polypeptide in species II and the most likely genetic change that produced the polypeptide in species III.

(b) **Predict** the effects of the mutation on the structure and function of the resulting protein in species IV. **Justify** your prediction.

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Scoring for Sample 5A

* 1 point for explaining that a point mutation occurred in species II which resulted in a single amino acid change
* 1 point for explaining that a nonsense mutation occurred in species III, introducing a stop codon, which prevented the “furtherment” of the polypeptide
* 1 point for predicting that in species IV a frameshift mutation changed the structure and function of the protein and make in nonfunctional
* 1 point for justifying the prediction that the frameshift mutation would mess up the polypeptide chain entirely after the Val